Seeing is believing

Safe practices and personal protection prevent eye injuries

By Markisan Naso, associate editor

Wrapped in a tough, elastic layer of densely woven collagen fibers, the human eye is sturdy enough to withstand a barrage of punches from a heavyweight boxer.

Despite this natural resilience, however, the eye frequently is damaged in American industrial workplaces, where moveable machinery, tools and equipment can generate more force than the heavy thud of fist and bone.

Nearly one-fourth of all eye injuries are work-related. Three-fourths of those injuries are caused by flying objects associated with hand tools or machines, according to the American Public Health Association, Washington. Common injuries include lacerations, abrasions, burns, contusions and particles embedded in the eye. "Sometimes it's a nightmare," said Richard Bensinger, an ophthalmologist at Seattle's Swedish Medical Center. "I saw a woman just a couple weeks ago. She was in a shop where milling and grinding was being conducted, and was at a workbench doing something that did not require eye protection. Someone at an adjacent bench was using a drill and the drill exploded. It just broke into pieces. A part flew across the room. She was four or five feet away and it hit her right in the eye. The eye in question was lost – she in fact needed to have her destroyed eye removed and now wears a prosthetic."

Protect and prevent

According to Chicago-based Prevent Blindness America, 90 percent of workplace eye injuries are preventable with safe work procedures and eye protection. A good safety plan begins by putting controls in place to minimize objects from becoming airborne. This can be done by evaluating the safety hazards of machinery; minimizing hazards from falling or unstable debris, dust, smoke, chemicals and metal particles; making sure tools work properly; and ensuring safety features such as machine guards, are in place. Workers must know how to use all tools and equipment properly and should be aware of potential hazards around them. It only takes a second for something to go wrong, especially in high-risk industries such as manufacturing, construction and metalwork. "A carpenter will be working all day, wearing safety glasses, doing all the right things. He finishes his work, puts his tools away, takes his safety glasses off and then he notices there's a board that needs another nail," Bensinger said. "He does that last pounding without his glasses and the nail flies back and hits his eye. It's astounding how often it happens."

Workers must be aware of people around them. Bensinger said workers often finish their tasks and remove their goggles, even though nearby co-workers are still using machines or equipment. Many people sustain eye injuries from other workers' mistakes or accidents.

The most common eye accidents occur when workers choose not to wear protection at all. Prevent Blindness America estimates as many as 2,000 workers suffer work-related eye injuries every day. More than half that number includes employees who fail to put on goggles, glasses or face shields. Although awareness and the use of protection have increased in recent years, Bensinger said some workers still believe eyewear is a nuisance. "It takes an extra step. It requires you have something in front of your eyes that has to be cleaned on a regular basis and that can interfere with your sight, so people are reluctant to wear protection."

Despite some workers' personal feelings, they should know OSHA requires employers to ensure the safety of all employees in a work environment. This includes providing eye and face protection at no cost to employees. When it comes to choosing this protection, only eyewear meeting American National Standards Institute standard Z87.1-1989 should be used. Eye protection meeting these requirements is identifiable by a mark on the lens or frame of the eyewear. Obtaining the right kind of personal protective equipment is crucial as well. Make sure workers have the right equipment for the task.

Another important consideration is the fit of the eye protection. Each worker is different and will require unique adjustments to goggles, glasses or shields. If protective eyewear does not fit properly, it can be ineffective and dangerous.

Knowledge and care

Sometimes even good safety procedures and equipment can't prevent an eye injury from occurring. Bensinger said the worst eye injuries are blunt or penetrating injuries. "Any blunt object that penetrates an eye, carries with it so much energy that it does a severe disruption to the inside of the eye. Now, you can get a tiny particle that may

> ## "The eye is vulnerable because it is always out there."
>
> – Richard Bensinger
> Swedish Medical Center

Feature at a Glance

Workers' eyes are damaged frequently in American industrial workplaces, where moveable machinery, tools and equipment can become airborne or chemicals can splash.

Key points

- Nearly one-fourth of all eye injuries are work-related. Common injuries include lacerations, abrasions, burns, contusions and particles embedded in the eye.
- Ninety percent of workplace eye injuries are preventable with safe work procedures and eye protection.
- More than 1,000 non-protected workers suffer eye injuries every day.
- When eye injuries occur it is important to know how to care for victims of penetrating wounds and chemical splashes.

Eye on safety

These first aid tips can help minimize the severity of eye injuries:

Specks in the eye
- Do not rub the eye.
- Use an emergency eyewash and flush eye copiously.
- See a doctor if speck does not wash out, or if pain or redness continues.

Cuts, punctures, objects stuck in the eye
- Do not wash out the eye.
- Do not try to remove stuck objects.
- Stabilize the eye with a rigid shield without putting pressure on the embedded object.
- See a doctor immediately.

Chemical burns
- Immediately flush the eye out with drinkable water. Open the eye as wide as possible, and flush continuously for at least 15 minutes.
- For caustic or basic solutions continue flushing while en route to the doctor.
- If a contact lens is in the eye, flush over the lens immediately. Flushing may dislodge the lens.
- See a doctor immediately.

Blows to the eye
- Apply a cold compress to the eye without pressure.
- Crush ice in a plastic bag and tape it to a person's forehead so it rests gently on the injured eye.
- See a doctor at once if pain continues, vision is reduced, blood is in the eye or discoloration occurs.

Source: NIOSH, 2005

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enter the eye and sometimes they can come out okay because it will slice through and won't pound the eye. But if you have enough force to break through the outer coats of the eye to get an object on the inside, that's a blunt injury. The eye is absorbing all that energy. Those eyes are almost always lost."

When workers' eyes are penetrated they must receive immediate medical attention. Bensinger said very little can be done on site for these injuries. "You don't want to press on the eye," he said. "A patch or something else that can keep someone from pushing on the eye should definitely be used."

Other eye injuries are more easily treated on scene. Eye injuries caused by chemicals, for example, need to be flushed out with water or eyewash immediately. Although chemicals account for just 10 percent of all eye injuries they often can inflict terrible damage. Bensinger said chemicals fall into two basic categories – alkali and all the rest. When alkali chemicals hit the eye they penetrate all the way through. "Tissue gets dissolved and [alkali] can actually enter the eye and disrupt some of the internal components. Alkali burns can cause chronic problems with the eyes and commonly cause permanent change such as blindness."

The second category includes other chemicals like gasoline or acids that cause a nasty surface disturbance but don't penetrate the eye very well.

Workers who handle any chemicals should have an eyewash station or an eyewash bottle close by. Bensinger said workers must be aware of the chemicals they work with, as well as the possible remedies should an accident occur. "I always think of a case I saw, now 20 years ago, where somebody splashed alkali in his eyes. His colleagues recognized the seriousness of it. They hauled him into a car, ran red lights and had him in the hospital in about 12 minutes. By then the damage was extensive and he never really recovered. If they had instead rushed him into the nearest bathroom and held his head under the faucet for 12 minutes they probably would have saved his eyes."

Saving someone's eyes also can be as simple as evaluating hazards in a workplace and providing the proper protection. Workers orient themselves with their eyes, they lead with their eyes and when they set out to perform a task their eyes need to be in the same visual line as the equipment they're working on, Bensinger said. "The eye is vulnerable because it is always out there," he said. **S+H**

Relevant sessions: National Safety Council's 93rd Annual Congress & Expo
Session 102: Preventing Industrial Eye Injuries, *Thursday, Sept. 22, 1:30-3 p.m.*

For more information

- American Public Health Association
  www.apha.org

- National Safety Council Library
  E-mail *library@nsc.org*
  or call (630) 775-2199

- NIOSH
  www.cdc.gov/niosh/topics/eye

- OSHA
  www.osha.gov

- Prevent Blindness America
  www.preventblindness.org

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